TRAFFIC CONGESTION IN CITY: CAUSES AND SOLUTIONS

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ABSTRACT

Congestion usually relates to an excess of vehicles on a portion of roadway at a particular time. It is not only relating to pollution but has huge impact on economy, time and energy. As there is high development in various areas there is a requirement of fast and efficient transportation system. Around 80% of passenger transportation is by road and rail together also 60% goods movement by road, this leads to increase in private vehicles causing congestion which further leads to an increase in travel time and emission of exhaust gases causing air pollution. Therefore, many techniques have been used in traffic control systems. This paper states different techniques of traffic control system that are used for the improvement of the traffic control system.

Keywords: economy, private vehicles, travel time, ITS, wireless technology, sensors, RF-transmitter, RF-receivers.

I. INTRODUCTION

The average time spend on the transportation is considerable, and due to high traffic congestion, this travelling time increases which results into un-utilization of productive human-hours. The infrastructure available is required to be utilized more effectively. Indian conditions are way different than other regions as there are different factors which impact on the mobility of people, goods and other resources. The road infrastructure of India is not enough to handle this high traffic loads which ultimately results into traffic congestion and very slow movement of traffic. Everyone should reach their destination in short time. In day today life, the number of accidents happens on a road are also increases more & more. So, it is important to make our traffic control system intelligent, in the future to avoid the accidents & to control the traffic on the road.

The existing transport system in Indian city area is not able to keep up with the fast-increasing demand over the past few years, particularly the ‘Bus Systems’. The last decades have seen a decline in the level of Bus services in the country. Therefore, their output is further diminished as passengers and drivers opt to travel with private and semi-private vehicles.

This paper gives brief introduction about different techniques used for traffic control systems that are proposed by other authors to make traffic flow easily and also make these systems automatic. Some of the techniques uses man power to control the traffic flow, but it is inefficient during heavy traffic jams. Some of the authors use automatic traffic control system. In these techniques they have used fixed time interval for red and green signal lights. Therefore, an intelligent traffic control system has been developed after research and experience of the engineers. This system collects real time data and manages traffic flow very efficiently.

II. METHODOLOGY

Many research papers have been studied carefully by considering every possible parameter. Literature survey is definitely the most important part of any project as it shows us direction to proceed and gives us an insight about the research done by various authors around the world. We are able to set achievable objectives for our project. Various papers related to traffic management techniques and solutions, were considered to get an outlook towards the problem, as it turns out traffic congestion is a very common problem in today’s day. Then papers about various types of Survey which gave the exact idea about the problem and local people’s insight on the seriousness of the problem. This included study of the area, interaction with local people, officials and experts, etc.

The Preliminary Survey included collecting data by conducting various surveys like Volumetric Study, Road-Side Interview Surveys, Occupancy Factor Survey, Origin-Destination Survey, Speed and Delay Survey, Accident Survey, etc. Based on the observations made during the field surveys and analysis of data obtained by those surveys, the most obvious and common problems have been identified and correct solutions were then formulated as per the area of study. The cost of these alternative solutions and their impact on the traffic flow or congestion, were calculated using various computer software/simulations. The impact of Metro Rail Project was also considered.
a) Causes for Traffic Congestions

Inadequacy of Traffic System
The traffic system simply fails during peak hours, there are long queuing of vehicles near the junction. There is desperate need of 2-3 policemen to regulate the traffic. There is involvement of a huge number of human labors needed to regulate the traffic smoothly within this area consisting of just 3 major intersections.

Narrow Roads
The major routes connecting the IT parks are not provided with wide enough roads for a free flow of traffic. Although most of these roads have undergone road-widening not long ago, the illegal encroachment of these hawkers still creates bottlenecks at and along road intersections.

Illegal road-side Parking
Parking illegally at road side has now a days become very common. It’s like public have stopped caring about the traffic and have become very selfish. This selfishness costs time not just for them but also for other people.

Increasing number of Vehicles
With a rapidly growing IT Sector in city area, there is a continuous increase in number of employees travelling. This overloads the transport system as the number of Commuters rapidly increases every day.

High purchasing power of the Public
The standard of living increases along with the growth of income due to IT sectors. This encourages commuters to travel alone and they prefer a car where they can get maximum comfort. This results in an increase in the share of Private vehicles.

Unnecessary Public Transport Facilities
The frequency of public bus is very low in IT sectors which is ironic given that this should be the route for public transport vehicles. Observing that buses have then been issued by the local authorities and IT companies itself. Knowing this still the employees prefer private transportation because they think it gives them more freedom of movement. This reduces the need of public transport.

Improper Planning
Basic infrastructure has been developed after the development of companies and apartments. This has led to the deficiencies of infrastructural development of overall area.

Improper Lane Management
One of the very common causes of traffic congestion in every developing country is improper lane management. Commuters are in hurry to reach their destination without caring for the traffic laws and indirectly end up slowing themselves.

Improper Public Behavior
In India there are always people seen not following the traffic rules. This behavior of the public is dangerous as it possesses the threat of accidents, not only with vehicles but for the pedestrians too. Strict action must be taken for people who are not complying with the rules.

b) Solutions
Various solutions for traffic congestion in a chowk situated in a city, which is the center of IT hubs can be as listed below:

- Propose Alternate Routes.
- Contraflow Lanes.
- Staggering the office timings as much as possible.
- Dedicated Bus Lane.
- Reduction of diameter of circle. (if any)
- Removal of Encroachment near the chowk and busy routes.
- Schedule roadwork at night time as much as possible.
- A rule can be made to allow a private 4-wheeler only for three or more passengers in that particular chowk.

c) Different Traffic Management Techniques
There are Smart Technologies which make use of Computer software, sensors and satellites to manage traffic in urban areas. The cost of implementing these techniques is very much higher than other solutions mentioned above. These techniques are:
Intelligent Transport System (ITS)

Intelligent transport systems vary in technologies, from a very basic systems such as car navigation though global positioning system; traffic light control systems; signs boards; number plate recognition: speed cameras to monitor and control over speeding, CCTV camera security systems; and to more advanced equipment that integrate live data and feedback from many of the other sources, such as parking guidance systems; weather reports. This all data is gathered and processed to give live solutions to the drivers and traffic controllers to ensure smooth and safe flow of traffic across the city.

Swarm Technology

Swarm intelligence is the independent, self-organizing system. Swarm intelligence technology is used in Telephone network. France and British are the countries using this technology for the Phone network. The term Swarm represent an aggregation of all the technologies set in action to work collectively to achieve their day to day tasks in an intelligent and efficient manner.

Intelligent Traffic Management Technique based on Image Processing

This technique uses cameras fitted all over the street, which are used to capture image of the traffic congestion density on the roads. These cameras are placed on a pole of 3-meter height so that they can capture long distances. Image captured by cameras is analyzed by a computer program in order to detect vehicles activity on road. Then computer will carefully calculate the timings for the red and green signal lights in order to control the traffic density and then sends this data to traffic signals. Now, according to this information, red and green signal will continuously change their timings. Sometimes, this technique is not efficient because camera cannot cover long distances during high traffic jams and during heavy rain, images captured by cameras are not clear.

Traffic Management system by using Wireless Technologies

In this technique all the emergency vehicle (like ambulance or police vans) are equipped with RF-transmitter and RF-receiver is installed on the signal pole. When an emergency vehicle is arriving near to the intersection, transmitter will send signal to the RF-receiver and forward it to the main control system. Then control system is responsible for calculating the approx. amount of time for green signal where the emergency vehicle is supposed to be moving and keeping red light to all the remaining lanes. So that the emergency vehicle will pass the intersection easily.

Electronic Toll collection

This technique uses a sensor and a unique card which is fitted in the car. The card has a digital wallet connected to it which needs to be recharged. As the car passes the toll terminal the sensors sense the card and the toll amount is automatically deducted from the digital wallet linked to it. If there is less or no funds available the owner is given some time to pay the toll. This technique can reduce the long ques on a toll plaza thus reducing the travel time.

Hydraulic Traffic Reduction System

This system uses the basic sensor or cameras to check the ques on the one side of the road. If the ques exceed the pre decided length the foot paths which are loaded with hydraulic systems are pushed down into the ground till the level of the road. This gives some extra space for the new que of vehicles. This technique might not reduce traffic but provide more area for the vehicles to move.

III. RESULTS AND DISCUSSION

The solutions for traffic congestion in a chowk are the solutions which are used after the city has been developed. As those are the problems which are related to specific area and location where the infrastructure has already been established and in use for years.

Traffic Management Techniques are very costly to implement. They also need trained personal to handle these new technologies and harness its power to the fullest. They can be very effective if considered while town planning and development of the town. It becomes easy to monitor traffic and makes it safe for the people. Crime can be fought with the help of CCTVs installed on the streets. It also helps the public and tourists to find their route to the stops they want to visit.

IV. CONCLUSION

This paper gives brief introduction about various traffic management techniques based on input methods. The study of traffic management technique concludes that different techniques are having their own pros and cons.

V. REFERENCES


